GET BACK TO BASICS TO IMPROVE RELIABILITY, PRODUCTIVITY, DESIGN...For

Non Engineers: Plumbers, Electricians, Instrument Technicians, Pipefitters, Equipment Operators, Maintenance Staff, etc.

Engineers: All types

Management: All levels

This program puts fundamental engineering principles in everyday terminology that enhances the understanding of any process or equipment function. This practical information will benefit both the technical and non-technical person.

Course Outline

A. Basic Engineering Principles

1. The First Law of Thermodynamics
   - Conservation of Energy
   - Application to Equipment
     - Boilers
     - Compressors
     - Pumps
2. Second Law of Thermodynamics
   - Minimum Work
   - Efficiency
   - Availability (Ability to do Work)
   - Thermodynamically "Bad" Processes
     - Unrestrained Expansion
     - Heat Transfer through a large Temp. Diff.
     - Friction
     - Mixing
3. Boilers
   - Combustion
   - Boiler Efficiency
     - Effect of Different Fuels
     - Variables that Affect Boiler Efficiency
   - Properties of Water and Steam
     - Use of Steam Tables
4. Vapor Compression Refrigeration
   - Cycle Description
     - Components and Process
   - Compressor Work and Heat
     - Coefficient of Performance
       - Carnot COP
       - Variables that Affect Refrigeration Efficiency
   - Use of Refrigerant Tables
5. Pumps/Fans
   - Determining Minimum Pump/Fan Work
   - Variables Affecting Pump/Fan Work
   - Pump/Fan Efficiency
   - Use of Pump/Fan Curves

B. Heat Transfer

1. Fundamental Concepts
   - Conduction
   - Convection
   - Radiation
2. Conduction Heat Transfer
   - How Conduction Works
   - Thermal Conductivity
   - How Insulation Works
   - The Conduction Equation
   - Problems Involving Conduction
3. Convection Heat Transfer
   - How Convection Works
   - Forced Convection
   - Natural Convection
   - Convective Heat Transfer Coefficients for Liquids and Gases
   - Problems Involving Convection
4. Radiation Heat Transfer
   - How Radiation Works
   - Wave Length Variations with Temperature
   - Emissivity of Surfaces
   - Radiation Shielding
   - Problems Involving Radiation
5. Boiling and Condensing Heat Transfer
6. Types of Heat Exchangers
   - Shell and Tube
   - Finned Tube
   - Radiative
   - Counter Flow
   - Cross Flow
7. Heat Transfer in Real Equipment
   - Boilers
     - Water Side
     - Fire Side
     - Effect of Scale or Soot
     - Effect of Excess Air
   - Chillers
     - Water Side
     - Refrigerant Side
     - Effect of Water Flow Rate
     - Effect of Fouling
   - Air Cooled or DX Units
     - Air Side
     - Refrigerant Side

C. Fluids Mechanics

1. Concepts of Fluid Mechanics
   - Pressure
     - Static Pressure
     - Total Pressure
     - Velocity Pressure (Momentum)
   - Bernoulli Equation
     - Interdependence of Velocity and Pressure
   - Fluid Friction
     - Viscosity
     - Shear
     - Boundary Layers
     - Flow Regimes
     - Laminar Flow
     - Turbulent Flow
     - Compressible and Incompressible Fluids
2. Fluid Flow
   - Pipe Flow
     - Developing Flow
     - Fully Developed Flow
     - Pressure Loss
   - External Flows
3. Measuring Velocity and Flow Rate
   - Pitot Tube
   - Hot Wire Anemometer
   - Orifice Plate
   - Venturi Meter
   - Turbine Meter
   - Pressure Drop Through Resistance
   - Other

D. Psychrometrics

1. Definitions
   - Vapor Pressure
   - Specific Humidity
   - Relative Humidity
   - Dew Point
   - Dry Bulb Temperature
   - Wet Bulb Temperature
   - Total Enthalpy
2. Using the Psychrometric Chart
   - Cooling Processes
   - Heating Processes
   - Mixing
   - Humidification
   - Dehumidification
   - Tracing Air Handler Processes
   - Calculating Heating and Cooling Loads

FOUR WAYS TO REGISTER:

1. Mail: Registration Form to Program Director, B.E.I., P.O. Box 2255, Auburn, AL 36831-2255.

2. By Phone: 1-800-669-6998 (Registration Hotline).

3. By FAX: (334) 887-3757.

4. By e-mail: Send all the information requested in the registration form below, including the course location and date of course to the following e-mail address: melanie@boilerinstitute.com

Whichever method you select, you will receive a confirmation of registration by mail and FAX if your registration is received at least two weeks prior to the course date. Please call or FAX in your registration if the course will take place in two weeks or less.

REGISTRATION FEE

The registration fee is $150 and includes registration, textbook, program materials and break refreshments. **CREDIT CARDS ACCEPTED**. Lodging and meals not included.

A Certificate of Participation is presented to each registrant. Proceedings are not published.

Hotel Reservations/Seminar Location

Workshop location and dates are listed in the registration form below. Seminar participants are responsible for making their own hotel reservations. We recommend that you make your hotel reservations early. Please telephone the hotel to make a reservation.

Seminar Hours

Plan to arrive at 7:45 a.m. on the first day of the seminar for sign-in and on-site registration. Seminar hours are 8:00 a.m. to 4:00 p.m.

Cancellation, Substitution and Transfer Policy

If you are unable to attend the course for which you have registered, you can substitute another person in your place. Cancellations must be made one week before the program for a full refund.

REGISTRATION FORM

Engineering Fundamentals in Everyday Language

Phone (334) 821-3095

Course Location:

Michelin Conference Center
517 Michelin Road
Greenville, SC 29605

April 3, 4, & 5, 2007
Tuesday, Wednesday, & Thursday

❑ Check Enclosed – Fee: $150 Checks Payable to: Boiler Efficiency Institute, P.O. Box 2255 • Auburn, AL 36831-2255

❑ Bill P. O. No._____

Credit Card: ❑ MasterCard ❑ Visa ❑ American Express Expiration Date:

Card No. _____ Signature _____

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

e-mail _____

Phone _____ FAX _____

BACKGROUND

The Boiler Efficiency Institute has presented several hundred practical workshops on plant operation improvement for cost reduction over the last ten years.

During this time, more than 30,000 people have benefitted from their participation in these programs.

The team has no vested interest in any product. All information will be presented from an objective viewpoint based on the experience of the lecturers.

PROGRAM DESCRIPTION/OBJECTIVE

The purpose of this program is to teach the fundamentals of engineering without the complexity of mathematical manipulations. By understanding the fundamental laws which govern the thermodynamic world we live in, you will be able to not only explain how things work but also interpret what went wrong when things don't work.

The information presented in this seminar will enhance your understanding of any process and the function of any piece of equipment found in the physical plant. This includes boilers, chillers, air handlers, pumps, compressors, fans, heat exchangers, controls, etc.

The emphasis in this course is on understanding the most basic concepts of thermodynamics, heat transfer, and fluid flow. Although sample calculations will be given, teaching the ideas and concepts in easy-to-understand terms will be the primary objective.

JUSTIFICATION

A basic understanding of thermodynamics, heat transfer, and fluid flow will:

- help you spot equipment problems before there problems.
- help you diagnose equipment malfunctions and failures.
- help eliminate costly design and installation errors.
- help you define and implement a more cost effective control strategy.

This program will give you the basic engineering tools that will allow you to better meet the challenges of designing, operating, or troubleshooting any piece of equipment that uses or transfers energy.

One of the reasons for billions of dollars of waste is that non-engineers have great difficulty in quantifying savings from operation/design changes. Managers have equal difficulty in evaluating proposed changes. This course will teach both groups how to quantify and evaluate savings.

ABOUT THE COURSE

The course outline as presented in this brochure is presented in a three-day (approximately 20-hour) program. Many hands-on experiments will be run to demonstrate and verify the principles being taught. This hands-on experience is an invaluable teaching aid.

Instructors

Tom Burch, Ph.D., P.E., Adjunct Professor of Mechanical Engineering, Auburn University
David Dyer, Ph.D., P.E., Professor and Chair of Mechanical Engineering, Auburn University
Glenn Maples, Ph.D., P.E., Professor of Chemical Engineering, Auburn University

Instructors make the class practical and enjoyable.

Instructors make complicated ideas seem simple.

The instructors have a combined total of over 100 years of experience with facilities in operation, design, testing and trouble-shooting. Collectively, they have conducted over 1000 workshops and seminars dealing with the issues of energy auditing, maintenance, plant optimization, plant design, safety, etc. In addition, they have written 12 practical books and numerous technical papers on reducing boiler facility operating costs.

Working "$mart" and $aving Money

For Industrial, Commercial and Institutional Facilities

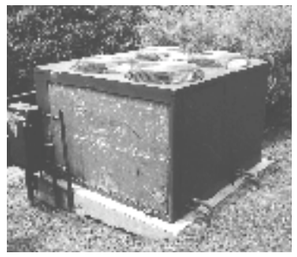
BOILER EFFICIENCY INSTITUTE ANNOUNCES THREE-DAY WORKSHOP ON

"Engineering Fundamentals in Every-Day Language"

Visit our Web Site at www.boilerinstitute.com

Course is worth 2.4 C.E.U.'s and 20 PDH's

Program Sponsored by the South Carolina Energy Office



Professional Engineers are required to obtain 15 Professional Development Hours (PDHs) each year. The Engineering Fundamentals Workshop will fulfill this requirement. Professional Engineers will be given priority in registering for this course.

Thermodynamics, Heat Transfer, Fluid Flow and Psychrometrics for Operation, Management, Engineering Personnel

LOCATION/DATE
April 3, 4, & 5, 2007
Greenville, South Carolina

PRESENTED BY:
Boiler Efficiency Institute
Registration Hotline: 1-800-669-6948
FAX: (334) 887-3757
e-mail: melanie@boilerinstitute.com